

L1[n_] := Select[Union@@Outer[Plus, Range[n]^2, Range[n]^2], PrimeQ]

Mod[L1[10], 4]

{2, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1}

L2[n_] := Select[Union@@Outer[Plus, Range[4 n]^2, 16 Range[n]^2], PrimeQ]

L2[10]

{17, 41, 73, 89, 97, 113, 137, 193, 233, 241, 257, 281, 313, 337, 353, 401, 409, 433, 449,
457, 521, 569, 577, 593, 601, 617, 641, 673, 761, 769, 809, 857, 881, 929, 937,
953, 977, 1009, 1033, 1049, 1097, 1129, 1153, 1193, 1201, 1217, 1249, 1289, 1297,
1321, 1361, 1409, 1433, 1481, 1489, 1553, 1601, 1609, 1657, 1721, 1753, 1777,
1801, 1873, 1889, 2113, 2129, 2137, 2153, 2393, 2441, 2521, 2689, 2969, 3121}

Mod[L2[10], 8]

{1,
1,
1, 1}

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L3[n_] := Select[Union@@Outer[(4 #1^2 + 4 #1 #2 + 5 #2^2) &, Range[n], Range[n]], PrimeQ]

L3[30]

{13, 29, 53, 61, 149, 157, 173, 181, 229, 269, 277, 293, 317, 389, 397, 421,
461, 541, 557, 613, 653, 661, 709, 733, 773, 821, 829, 853, 877, 941, 997,
1013, 1061, 1093, 1109, 1117, 1213, 1229, 1301, 1373, 1429, 1549, 1597, 1621,
1637, 1693, 1709, 1741, 1861, 1877, 1901, 1949, 1973, 1997, 2029, 2069, 2213,
2221, 2269, 2293, 2309, 2333, 2357, 2381, 2389, 2437, 2677, 2693, 2741, 2749,
2797, 2837, 2909, 2957, 3061, 3109, 3181, 3221, 3229, 3253, 3301, 3461, 3469,
3517, 3557, 3581, 3613, 3637, 3677, 3701, 3709, 3733, 3797, 3821, 3877, 3917,
4021, 4157, 4253, 4349, 4397, 4421, 4517, 4549, 4597, 4621, 4637, 4733, 4789,
4813, 4877, 4973, 5101, 5309, 5381, 5413, 5437, 5573, 5669, 5717, 5749, 5981,
6173, 6197, 6221, 6229, 6389, 6397, 6469, 6637, 6781, 7069, 7333, 7541, 7589,
7741, 7829, 7853, 8429, 8677, 8693, 8741, 9157, 9293, 10141, 10253, 10589}

Mod[L3[30], 6]

{1, 5, 5, 1, 5, 1, 5, 1, 1, 5, 1, 5, 5, 5, 1, 1, 5, 1, 5, 1, 5, 1, 1, 1, 5, 5, 1, 1, 1, 5, 1,
5, 5, 1, 5, 1, 1, 5, 5, 5, 1, 1, 1, 1, 5, 1, 5, 1, 1, 5, 5, 5, 5, 5, 1, 5, 5, 1, 1, 1,
5, 5, 5, 5, 1, 1, 1, 5, 5, 1, 1, 5, 5, 5, 1, 1, 1, 5, 1, 1, 1, 5, 1, 1, 5, 5, 1, 1, 5,
5, 1, 1, 5, 5, 1, 5, 1, 5, 5, 5, 5, 5, 5, 1, 1, 1, 5, 5, 1, 1, 5, 5, 1, 5, 5, 1, 1, 5,
5, 5, 1, 5, 5, 5, 5, 1, 5, 1, 1, 1, 1, 1, 1, 5, 5, 1, 5, 5, 5, 1, 5, 5, 1, 5, 1, 5, 5}